



SEQUENCE LISTING

<110> THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
FAN, Hung Y.
PALMARINI, Massimo
SHARP, James M.

<120> A LUNG CANCER ASSOCIATED RETROVIRUS, GENE DELIVERY VECTOR AND
METHODS OF USE THEREOF

<130> UCI1150-1

<140> US 10/030,441

<141> 2002-05-16

<150> PCT/US 00/18856

<151> 2000-07-08

<150> US 60/142,868

<151> 1999-07-08

<160> 24

<170> PatentIn version 3.1

<210> 1

<211> 37

<212> DNA

<213> Artificial sequence

<220>

<223> Amplification primer

<400> 1

aaaggggtgc ggccgccgat gtacggggcca gatatac

37

<210> 2

<211> 30

<212> DNA

<213> Artificial sequence

<220>

<223> Amplification primer

<400> 2

cagagagctc tgcttatata gacctccac

30

<210> 3

<211> 27

<212> DNA

<213> Artificial sequence

<220>

<223> Amplification primer

<400> 3

gcattgtaat aaagcagagt atcagcc

27

<210> 4
 <211> 31
 <212> DNA
 <213> Artificial sequence

 <220>
 <223> Amplification primer

 <400> 4
 ggaaccaagg gcaaactcct caataaatga a 31

<210> 5
 <211> 20
 <212> DNA
 <213> Artificial sequence

 <220>
 <223> Probe

 <400> 5
 tgcgggggac gacccgtgaa 20

<210> 6
 <211> 20
 <212> DNA
 <213> Artificial sequence

 <220>
 <223> Probe

 <400> 6
 tgcggtttac gacccgtgaa 20

<210> 7
 <211> 10
 <212> DNA
 <213> Artificial sequence

 <220>
 <223> Consensus binding sequence

 <220>
 <221> misc_feature
 <222> (5)..(6)
 <223> n is any nucleotide

 <400> 7
 gggrnnyycc 10

<210> 8
 <211> 7455
 <212> DNA
 <213> Ovine pulmonary adenocarcinoma virus

 <400> 8
 gcagagtatc agccatcttg gtctgaccc ctcaacccca tcttttgtct ctctcttatt 60

ttcttagcga	ggacgctccg	ttctctccct	gtgcaggtgc	gactcttgct	tgtgctggcc	120
gcggcaggtg	gcgcccacg	tggggctcga	gctcgacagt	tttcttcgcc	actactctca	180
ttaattgaaa	caagtgagta	tatggataaa	cgggtgaatt	aatttaagga	ggagtagtaa	240
ggtatatagt	tgagagtata	aatatgggac	aaacgcatag	tcgtcagttg	tttgtacaca	300
tgctatctgt	aatggtgaaa	catagaggga	ttactgtttc	taaacctaaa	ttaattaatt	360
ttctttcatt	tattgaggaa	gtttgccctt	ggttccctag	agaaggtaca	gtaaatttgg	420
agacatggaa	gaaggtagga	gaacaaattc	ggacgcatta	taccttacat	ggctctgaaa	480
aagttcctgt	ggaaacttta	tccttttgga	cattaattcg	tgattgcttg	gattttgata	540
atgatgaatt	gaaacgttta	ggaaatttat	taaagcagga	agaagatcct	cttcatactc	600
ccgattcggg	acctagttat	gacctcctc	ctcctcctcc	cccatctctg	aaaatgcacc	660
cttcagacaa	tgatgattta	ctttcttcca	cagacgaggc	agaactggac	gaggaagctg	720
ctaaatacca	tcaagaagat	tggggttttt	tagcacagga	aaaaggggca	ttaacatcca	780
aagatgagtt	ggttgaatgt	tttaaaaatc	ttactattgc	tttacaaaat	gcaggaattt	840
cgcttcctca	taataatacc	tttccctctg	ctccgccttt	tcctcccgcc	tatactcctt	900
ctgttatggc	tggccttgat	ccccgcgccg	ggtttctctc	accgtctaaa	catatgtctc	960
ccctacaaag	ggccttaaga	caggcacagc	gacttggtga	agttgtttct	gatttttctc	1020
ttgcctttcc	tgtttttgaa	aataacaacc	agcgttacta	cgaatcactg	ccatttaagc	1080
aattaaaaga	attaaagatt	gcttggtcac	aatatgggcc	taccgcccc	tttaccattg	1140
ctatgataga	aaatttgggc	actcaagcct	tgccccaaa	tgattggaaa	cagaccgcta	1200
gggcatgtct	ctcaggagga	gattatttac	tatggaaatc	tgagtttttt	gaacaatgtg	1260
ctcgtatagc	tgatgttaac	cgacaacaag	gcatacagac	ctcttatgaa	atgttgattg	1320
gtgaagggtc	ttaccaggct	actgatacgc	aacttaattt	cttacctggg	gcgtatgcac	1380
aaatatcaaa	tgcgccccga	caagcttgga	aaaggcttcc	tagctccagt	actaaaacag	1440
aggatctttc	aaaagttcga	cagggaacctg	atgaaccata	tcaagatttt	gtggcacgcac	1500
ttttggatac	tataggtaag	ataatgtctg	atgagaaagc	cggaatggta	ttagcaaaac	1560
aattggcttt	tgaaaatgct	aactctgctt	gtcaagctgc	tttaagacct	tatcgaaaaa	1620
agggagatct	atctgatttt	attcgtattt	gtgctgacat	tgggccctct	tatatgcaag	1680
gtattgctat	ggcggcggca	ttacagggaa	aaagcataaa	agaagtactt	ttccaacaac	1740
aagctcgaaa	taaaaaaggg	cttcaaaaat	caggtaattc	aggttgcttt	gtctgtggtc	1800
aacctggcca	tcgagctgca	gtatgccctc	aaaaacaaca	aggccctggt	aataccccta	1860

atztatgtcc	acgatgtaaa	aaaggaaagc	attggg'gcgcg	agattgccgt	tccaagactg	1920
atgttcaagg	taatccttta	cccccggttt	cgggaaactg	ggtgaggggc	cagccccctgg	1980
ccccgaaaca	atgttatggg	gcaacactac	aggttccaaa	agaaccattg	cagacctctg	2040
tcgagccaca	agaggcagcg	cgggattgga	cctctgtgcc	acctcctata	cagtattaac	2100
tcccgaaatg	ggagttcaaa	ctcttgctac	gggagtgttt	gggcctttac	ctccagggac	2160
agctggactg	cttttagggc	gcagcagtgc	gtctttaaaa	ggaatactta	tccatcctgg	2220
tgtgattgac	tctgattata	caggagagat	aaaaatatta	gcctccgctc	ctaacaaaat	2280
tattgtaatc	aatgcaggac	agcgtatagc	tcaacttctt	ttagttccat	tagtcataca	2340
agggaaaaaca	attaaccgag	accgccaaga	taaaggtttc	gggtcctctg	acgcctattg	2400
ggtgcaaaat	gttaccgagg	cacgaccaga	actcgagcta	cgcattaatg	gtaagctttt	2460
ccgcggagtg	cttgatacag	gggccgatat	tagtgttatt	tctgataaat	attggcctac	2520
tacatggcca	aaacagatgg	ctatttccac	tctccagggg	attggccaaa	ctactaatcc	2580
agaacagagt	tcatcccttc	ttacttggaa	ggataaagat	ggacatacag	gccaatttaa	2640
accctatatt	ctgccccatc	ttccagttaa	tctatggggg	cgtgatatat	taagcaaaat	2700
gggtgtttat	ttatatagtc	cttcacccat	tgtgacagat	ttgatgttag	atcagggctt	2760
acttccaaat	caaggtttag	gtaaacaaca	tcaaggcatc	attttgcccc	ttgatttaaa	2820
atctaataca	gatcgacaag	gcttgggggtg	ttttccttag	ggacctctga	ttctcctgtg	2880
acacatgccg	atcctattga	ttggaaatct	gaggaaccgg	tatgggtcga	tcagtggccc	2940
ctaacacagg	aaaaactttc	tgccgcacaa	cagctgggtgc	aggaacagct	gagacttggg	3000
catattgaac	cctctacctc	tgcttggaat	tccccaatth	ttgttattaa	aaagaagtct	3060
gggaaatgga	gattgctaca	agatcttcgt	aaagtaaattg	aaacaatgat	gcacatggga	3120
gccctacaac	ctgggttgcc	cactccttct	gctatacctg	ataagtccca	tatcattggt	3180
atagatttaa	aagattgctt	ttacactatt	cctcttgcac	ctcaagattg	caaaagattt	3240
gctttcagtt	taccttctgt	taattttaaa	gagcctatgc	aacgctatca	atggagagtt	3300
ctcccgaag	gaatgactaa	tagccctacg	ctgtgccaaa	aatttggtgc	tacagcaata	3360
gctccggttc	gtcaacgttt	tcctcagcta	tacttggttc	attatatgga	tgatatatta	3420
ctagctcatg	ctgacgaaca	tttggtgtat	caagcttttt	cgattctaaa	acaacattta	3480
agtcttaattg	gtcttggtat	tgccgatgaa	aaaattcaga	ctcatttccc	ttataattat	3540
ttgggtttct	ccttatatcc	tcgtgtttat	aatactcaat	tagtaaaact	gcagactgac	3600
catttaaaaa	ctctaaatga	ctttcaaaaa	cttttaggag	acattaactg	gatacgcccc	3660
tatttgaaat	taccactta	taccttgacg	ccattatttg	acattcttaa	aggtgactct	3720

gatcctgcat	caccccgaac	actttcttta	gaaggacgaa	ctgctttaca	atcaatagaa	3780
gaagctatta	gacaacaaca	gattacttat	tgtgattacc	aacgatcatg	gggtttgtat	3840
atacttccta	ccccccgagc	acccacaggg	gttctctatc	aagataaacc	tttgcgatgg	3900
atatactgt	ctgctactcc	aactaaacat	ctgctccctt	actatgaact	tggtgcaaaa	3960
attgtagcaa	agggacgcca	cgaggccatc	caatattttg	gtatggaacc	cccctttatt	4020
tgtattcctt	atgctttaga	acaacaagat	tggctttttc	aattttcaga	caattggtct	4080
atagcttttg	caaattaccc	gggacagatt	actcatcatt	atccttccga	taaattgtta	4140
caatttgcta	gctctcatgc	ctttattttt	ccaaaagtag	ttcgccgaca	gcctattccc	4200
gaagcgacac	ttatatTTTt	agatggatct	tctaattggaa	ctgcagcttt	aatcattaat	4260
catcaaacct	attacgcaca	aaccagtttt	tcttctgctc	aagttgtgga	attatttgca	4320
gtccaccaag	cgttgctaac	tgtacctact	tccttcaatt	tatttacaga	cagctcctat	4380
gtggtcggtg	ccttacagat	gattgaaact	gttcagttta	tcggcactac	ctctccggaa	4440
gttcttaact	tattcacatt	gattcaacag	gttctccatt	gccgccaaca	cccctgtttt	4500
tttggacata	ttcgtgcaca	ttccactctt	cctggcgccc	tggtacaagg	caatcatact	4560
gcggatgttc	ttactaaaca	aatgtttttt	caatcagcta	ttgatgcagc	ccggaaatcc	4620
catgatttac	atcaccaaaa	tagtcattct	ttacgcttgc	aatttaaaat	ttctcgtgaa	4680
gctgcacggc	aaattgttaa	atcttgttct	acttgtcctc	aattccttgt	tctccctcaa	4740
tatggtgtca	accctcgagg	tttacgccct	aatcacctct	ggcaaacaga	tgttactcac	4800
attcctcaat	ttggacgtct	taaatatgtt	catgtttcta	ttgacacttt	ttccaatttt	4860
ctcatggcct	ctcttcacac	tggagaatct	acacgtcact	gtattcaaca	tttattgttt	4920
tgtttttcta	cttcaggaat	ccctcaaacc	cttaagacag	ataatggacc	tgggtatact	4980
agccgttctt	ttcaacgttt	ttgtctttct	tttcaaattc	atcataaaac	agggattcct	5040
tataatccac	agggacaagg	tattgtggaa	cgagcccatc	aacgccttaa	acatcaatta	5100
ttaaaacaaa	aaaaggggaa	tgaattgtat	agcccctcac	cgcataacgc	cttgaaccat	5160
gctctttatg	ttttaaattt	tttaacttta	gacgcagaag	gcaattcagc	agcccagcga	5220
ttttgggggg	agcaatcctc	atgcaagaaa	ccacttgtac	gatggaagga	tccattttacg	5280
aatctgtggt	atggggccaga	tcctgtatta	atatggggac	gagggcatgt	ttgtgttttt	5340
ccacagaatg	ccgaagcgcc	gcgctggatt	ccggaaaggc	tggtacgcgc	ggcagaggaa	5400
ctccctgacg	catcaaattg	aacgcatgac	gctgagcgag	cccacgagtg	agctgcccac	5460
ccagaggcaa	attgaagcgc	taatgcgcta	cgcttggaa	gaggcacatg	tacaacctcc	5520

ggtgacacct	actaacatct	tgatcatggt	attattattg	ttacagcggg	tacaaaatgg	5580
ggcagctgcg	gctttttggg	cgtacattcc	tgatccgcca	atgattcaat	ccttaggatg	5640
ggatagagaa	atagtacccg	tatatgttaa	tgatacgagc	cttttaggag	gaaaatcaga	5700
tattcacatt	tcccctcagc	aagcaaatat	ctctttttat	ggccttacca	ctcaatatcc	5760
catgtgcttt	tcttatcaat	cgcagcatcc	tcattgtata	caggtatcag	ctgacatatc	5820
atatcctcga	gtgactatct	caggcattga	tgaaaaaact	gggaaaaaat	catacgggaa	5880
cggatctgga	cccctcgaca	ttccgttttg	tgacaagcat	ttaagcattg	gcataggcat	5940
agacactcct	tggactttat	gtcgagcccc	ggtcgcatca	gtatataaca	tcaataatgc	6000
caatgccacc	tttttatggg	attgggcacc	tggaggaaca	cctgattttc	ctgaatatcg	6060
aggacagcat	ccgcctatct	tctctgtaaa	taccgctcca	atataccaaa	cggaactatg	6120
gaaacttttg	gctgcttttg	gtcatggcaa	tagtttatat	ttacagccca	atatcagtgg	6180
aagcaaatat	ggtgatgtag	gagttacagg	atttttatat	cctcgagctt	gcgtgccgta	6240
tccattcatg	ttgatacaag	gccatatgga	aataacactg	tcattaaata	tttatcattt	6300
gaattgttct	aactgcatac	tgactaattg	tattagggga	gtagccaaag	gagaacagggt	6360
tataatagta	aaacagcctg	cctttgtaat	gctgcccgtt	gaaatagctg	aagcctggta	6420
tgatgaaact	gctttagaat	tattacaacg	cattaatacg	gctctcagcc	gccctaagag	6480
aggcctgagc	ctgattatct	tgggtatagt	atctttaatc	accctcatag	ctacagctgt	6540
tacgggcttc	gtatcttttag	cacagtctat	tcaagctgcg	cacacggtag	actccttatc	6600
atataatggt	actaaagtga	tggggaccca	agaagatatt	gataaaaaaa	tagaagatag	6660
gctatcagct	ctatatgatg	tagtcagagt	cttaggagag	caagttcaga	gcattaatct	6720
tcgcatgaaa	atccaatgtc	atgctaacta	taaatggatt	tgtgttacia	aaaagccata	6780
caatacttct	gattttccat	gggacaaaagt	gaagaaacat	ttgcaaggaa	tttgggtcaa	6840
tactaatcta	tcgttagacc	ttttacaact	gcataatgag	attcttgata	ttgaaaatct	6900
gccgaaggct	acactaaata	tagccgatac	tgttgataat	ttcttgcaaa	atttattctc	6960
taattttcct	agtctccatt	cgtctgtggaa	aaccctgatt	ggtgtaggaa	tacttgtggt	7020
tattataatt	gtcgtaatcc	ttatatctcc	ttgccttggt	cgtggcatgg	ttcgcgatct	7080
tctaaagatg	agagttgaaa	tgtcgcatat	gaaatataga	aatatgttac	agcaccaaca	7140
tcttatggag	cttttaaaaa	ataaagagag	gggagatgcg	ggggacgacc	cgtgaaggggt	7200
taagtctctg	gagctctttg	gcagaagcca	aagcctagga	caagtaccta	agctccctgt	7260
cccgccaccc	tcaagaattt	ttaaaagctc	ttaaggctcg	gatgtttgct	tttggcactg	7320
cttcatagaa	ataccaggaa	atctgattat	ataagaatcc	ggtgattgtg	taagaatccg	7380

gtgggtgtag tgaataatga ataaacaagt tatgtacttt ataaatatag cattgtaata 7440

aagcagagta tcagc 7455

<210> 9

<211> 611

<212> PRT

<213> Ovine pulmonary adenocarcinoma virus

<400> 9

Met Gly Gln Thr His Ser Arg Gln Leu Phe Val His Met Leu Ser Val
1 5 10 15

Met Leu Lys His Arg Gly Ile Thr Val Ser Lys Pro Lys Leu Ile Asn
20 25 30

Phe Leu Ser Phe Ile Glu Glu Val Cys Pro Trp Phe Pro Arg Glu Gly
35 40 45

Thr Val Asn Leu Glu Thr Trp Lys Lys Val Gly Glu Gln Ile Arg Thr
50 55 60

His Tyr Thr Leu His Gly Pro Glu Lys Val Pro Val Glu Thr Leu Ser
65 70 75 80

Phe Trp Thr Leu Ile Arg Asp Cys Leu Asp Phe Asp Asn Asp Glu Leu
85 90 95

Lys Arg Leu Gly Asn Leu Leu Lys Gln Glu Glu Asp Pro Leu His Thr
100 105 110

Pro Asp Ser Gly Pro Ser Tyr Asp Pro Pro Pro Pro Pro Pro Ser
115 120 125

Leu Lys Met His Pro Ser Asp Asn Asp Asp Leu Leu Ser Ser Thr Asp
130 135 140

Glu Ala Glu Leu Asp Glu Glu Ala Ala Lys Tyr His Gln Glu Asp Trp
145 150 155 160

Gly Phe Leu Ala Gln Glu Lys Gly Ala Leu Thr Ser Lys Asp Glu Leu
165 170 175

Val Glu Cys Phe Lys Asn Leu Thr Ile Ala Leu Gln Asn Ala Gly Ile
180 185 190

Ser Leu Pro His Asn Asn Thr Phe Pro Ser Ala Pro Pro Phe Pro Pro
 195 200 205

Ala Tyr Thr Pro Ser Val Met Ala Gly Leu Asp Pro Pro Pro Gly Phe
 210 215 220

Pro Pro Pro Ser Lys His Met Ser Pro Leu Gln Arg Ala Leu Arg Gln
 225 230 235 240

Ala Gln Arg Leu Gly Glu Val Val Ser Asp Phe Ser Leu Ala Phe Pro
 245 250 255

Val Phe Glu Asn Asn Asn Gln Arg Tyr Tyr Glu Ser Leu Pro Phe Lys
 260 265 270

Gln Leu Lys Glu Leu Lys Ile Ala Cys Ser Gln Tyr Gly Pro Thr Ala
 275 280 285

Pro Phe Thr Ile Ala Met Ile Glu Asn Leu Gly Thr Gln Ala Leu Pro
 290 295 300

Pro Asn Asp Trp Lys Gln Thr Ala Arg Ala Cys Leu Ser Gly Gly Asp
 305 310 315 320

Tyr Leu Leu Trp Lys Ser Glu Phe Phe Glu Gln Cys Ala Arg Ile Ala
 325 330 335

Asp Val Asn Arg Gln Gln Gly Ile Gln Thr Ser Tyr Glu Met Leu Ile
 340 345 350

Gly Glu Gly Pro Tyr Gln Ala Thr Asp Thr Gln Leu Asn Phe Leu Pro
 355 360 365

Gly Ala Tyr Ala Gln Ile Ser Asn Ala Ala Arg Gln Ala Trp Lys Arg
 370 375 380

Leu Pro Ser Ser Ser Thr Lys Thr Glu Asp Leu Ser Lys Val Arg Gln
 385 390 395 400

Gly Pro Asp Glu Pro Tyr Gln Asp Phe Val Ala Arg Leu Leu Asp Thr
 405 410 415

Ile Gly Lys Ile Met Ser Asp Glu Lys Ala Gly Met Val Leu Ala Lys
 420 425 430

Gln Leu Ala Phe Glu Asn Ala Asn Ser Ala Cys Gln Ala Ala Leu Arg

435 440 445
 Pro Tyr Arg Lys Lys Gly Asp Leu Ser Asp Phe Ile Arg Ile Cys Ala
 450 455 460

 Asp Ile Gly Pro Ser Tyr Met Gln Gly Ile Ala Met Ala Ala Ala Leu
 465 470 475 480

 Gln Gly Lys Ser Ile Lys Glu Val Leu Phe Gln Gln Gln Ala Arg Asn
 485 490 495

 Lys Lys Gly Leu Gln Lys Ser Gly Asn Ser Gly Cys Phe Val Cys Gly
 500 505 510

 Gln Pro Gly His Arg Ala Ala Val Cys Pro Gln Lys Gln Gln Gly Pro
 515 520 525

 Val Asn Thr Pro Asn Leu Cys Pro Arg Cys Lys Lys Gly Lys His Trp
 530 535 540

 Ala Arg Asp Cys Arg Ser Lys Thr Asp Val Gln Gly Asn Pro Leu Pro
 545 550 555 560

 Pro Val Ser Gly Asn Trp Val Arg Gly Gln Pro Leu Ala Pro Lys Gln
 565 570 575

 Cys Tyr Gly Ala Thr Leu Gln Val Pro Lys Glu Pro Leu Gln Thr Ser
 580 585 590

 Val Glu Pro Gln Glu Ala Ala Arg Asp Trp Thr Ser Val Pro Pro Pro
 595 600 605

 Ile Gln Tyr
 610

 <210> 10
 <211> 612
 <212> PRT
 <213> Ovine pulmonary adenocarcinoma virus

 <400> 10

 Met Gly His Thr His Ser Arg Gln Leu Phe Val His Met Leu Ser Val
 1 5 10 15

 Met Leu Lys His Arg Gly Ile Thr Val Ser Lys Thr Lys Leu Ile Asn
 20 25 30

Phe Leu Ser Phe Ile Glu Glu Val Cys Pro Trp Phe Pro Arg Glu Gly
 35 40 45
 Thr Val Asn Leu Glu Thr Trp Lys Lys Val Gly Glu Gln Ile Arg Thr
 50 55 60
 His Tyr Thr Leu His Gly Pro Glu Lys Val Pro Val Glu Thr Leu Ser
 65 70 75 80
 Phe Trp Thr Leu Ile Arg Asp Cys Leu Asp Phe Asp Asn Asp Glu Leu
 85 90 95
 Lys Arg Leu Gly Asn Leu Leu Lys Gln Glu Glu Asp Pro Leu His Thr
 100 105 110
 Pro Asp Ser Val Pro Ser Tyr Asp Pro Pro Pro Pro Pro Pro Ser
 115 120 125
 Leu Lys Met His Pro Ser Asp Asn Asp Asp Ser Leu Ser Ser Thr Asp
 130 135 140
 Glu Ala Glu Leu Asp Glu Glu Ala Ala Lys Tyr His Gln Glu Asp Trp
 145 150 155 160
 Gly Phe Leu Ala Gln Glu Lys Gly Ala Leu Thr Ser Lys Asp Glu Leu
 165 170 175
 Val Glu Cys Phe Lys Asn Leu Thr Ile Ala Leu Gln Asn Ala Gly Ile
 180 185 190
 Gln Leu Pro Ser Asn Asn Asn Thr Phe Pro Ser Ala Pro Pro Phe Pro
 195 200 205
 Pro Ala Tyr Thr Pro Thr Val Met Ala Gly Leu Asp Pro Pro Pro Gly
 210 215 220
 Phe Pro Pro Pro Ser Lys His Met Ser Pro Leu Gln Lys Ala Leu Arg
 225 230 235 240
 Gln Ala Gln Arg Leu Gly Glu Val Val Ser Asp Phe Ser Leu Ala Phe
 245 250 255
 Pro Val Phe Glu Asn Asn Asn Gln Arg Tyr Tyr Glu Ser Leu Pro Phe
 260 265 270

Lys Gln Leu Lys Glu Leu Lys Ile Ala Cys Ser Gln Tyr Gly Pro Thr
 275 280 285
 Ala Pro Phe Thr Ile Ala Met Ile Glu Ser Leu Gly Thr Gln Ala Leu
 290 295 300
 Pro Pro Asn Asp Trp Lys Gln Thr Ala Arg Ala Cys Leu Ser Gly Gly
 305 310 315 320
 Asp Tyr Leu Leu Trp Lys Ser Glu Phe Phe Glu Gln Cys Ala Arg Ile
 325 330 335
 Ala Asp Val Asn Arg Gln Gln Gly Ile Gln Thr Ser Tyr Glu Met Leu
 340 345 350
 Ile Gly Glu Gly Pro Tyr Gln Ala Thr Asp Thr Gln Leu Asn Phe Leu
 355 360 365
 Pro Gly Ala Tyr Ala Gln Ile Ser Asn Ala Ala Arg Gln Ala Trp Lys
 370 375 380
 Lys Leu Pro Ser Ser Ser Thr Lys Thr Glu Asp Leu Ser Lys Val Arg
 385 390 395 400
 Gln Gly Pro Asp Glu Pro Tyr Gln Asp Phe Val Ala Arg Leu Leu Asp
 405 410 415
 Thr Ile Gly Lys Ile Met Ser Asp Glu Lys Ala Gly Met Val Leu Ala
 420 425 430
 Lys Gln Leu Ala Phe Glu Asn Ala Asn Ser Ala Cys Gln Ala Ala Leu
 435 440 445
 Arg Pro Tyr Arg Lys Lys Gly Asp Leu Ser Asp Phe Ile Arg Ile Cys
 450 455 460
 Ala Asp Ile Gly Pro Ser Tyr Met Gln Gly Ile Ala Met Ala Ala Ala
 465 470 475 480
 Leu Gln Gly Lys Ser Ile Lys Glu Val Leu Phe Gln Gln Gln Ala Arg
 485 490 495
 Asn Lys Lys Gly Leu Gln Lys Ser Gly Asn Ser Gly Cys Phe Val Cys
 500 505 510
 Gly Gln Pro Gly His Arg Ala Ala Val Cys Pro Gln Lys His Gln Thr

515 520 525
 Ser Val Asn Thr Pro Asn Leu Cys Pro Arg Cys Lys Lys Gly Lys His
 530 535 540
 Trp Ala Arg Asp Cys Arg Ser Lys Thr Asp Val Gln Gly Asn Pro Leu
 545 550 555 560
 Pro Pro Val Ser Gly Asn Trp Val Arg Gly Gln Pro Leu Ala Pro Lys
 565 570 575
 Gln Cys Tyr Gly Ala Thr Leu Gln Val Pro Lys Glu Pro Leu Gln Thr
 580 585 590
 Ser Val Glu Pro Gln Glu Ala Ala Arg Asp Trp Thr Ser Val Pro Pro
 595 600 605
 Pro Ile Gln Tyr
 610
 <210> 11
 <211> 613
 <212> PRT
 <213> Ovine enzootic nasal tumour virus
 <400> 11
 Met Gly Gln Thr His Ser Arg Gln Leu Phe Val His Met Leu Ser Val
 1 5 10 15
 Met Leu Lys His Arg Gly Ile Thr Val Ser Lys Pro Lys Leu Ile Asn
 20 25 30
 Phe Leu Ser Phe Ile Glu Glu Val Cys Pro Trp Phe Pro Arg Glu Gly
 35 40 45
 Thr Val Asn Leu Glu Thr Trp Lys Lys Val Gly Glu Gln Ile Arg Thr
 50 55 60
 His Tyr Thr Leu His Gly Pro Glu Lys Val Pro Val Glu Thr Leu Ser
 65 70 75 80
 Phe Trp Thr Leu Ile Arg Asp Cys Leu Asp Phe Asp Asn Asp Glu Leu
 85 90 95
 Lys Arg Leu Gly Asn Leu Leu Lys Gln Glu Glu Asp Pro Leu His Asp
 100 105 110

Pro Asp Ser Glu Asn Ser Tyr Asp Ala Pro Pro Pro Pro His Pro Ser
 115 120 125

Leu His Ser Ser Arg Pro Ser Asp Asn Asp Asp Leu Leu Ser Ser Thr
 130 135 140

Asp Glu Ala Glu Leu Asp Glu Glu Ala Ala Lys Tyr His Gln Glu Asp
 145 150 155 160

Trp Gly Phe Leu Ala Gln Glu Lys Gly Ala Leu Thr Ser Lys Asp Glu
 165 170 175

Leu Val Glu Cys Phe Lys Asn Leu Thr Ile Ala Leu Gln Asn Ala Gly
 180 185 190

Ile Lys Leu Pro Ala Asn Asn Asp Lys Phe Pro Ser Ala Pro Pro Leu
 195 200 205

Pro Pro Ala Tyr Ala Pro Ser Val Val Ala Gly Leu Asp Pro Pro Pro
 210 215 220

Gly Pro Leu Pro Pro Ser Lys Asn Met Ser Pro Leu Gln Lys Ala Leu
 225 230 235 240

Arg Gln Ala Gln Arg Leu Gly Glu Val Val Ser Asp Phe Ser Leu Ala
 245 250 255

Phe Pro Val Phe Glu Asn Asn Asn Gln Arg Tyr Tyr Glu Ser Leu Pro
 260 265 270

Phe Lys Gln Leu Lys Glu Leu Lys Ile Ala Cys Ser Gln Tyr Gly Pro
 275 280 285

Thr Ala Pro Phe Thr Ile Ala Met Ile Glu Asn Leu Gly Thr Gln Ala
 290 295 300

Leu Pro Pro Asn Asp Trp Lys Gln Thr Ala Arg Ala Cys Leu Ser Gly
 305 310 315 320

Gly Asp Tyr Leu Leu Trp Lys Ser Glu Phe Phe Glu Gln Cys Ala Arg
 325 330 335

Ile Ala Asp Val Asn Arg Gln Gln Gly Ile Gln Thr Ser Tyr Glu Met
 340 345 350

Leu Ile Gly Glu Gly Pro Tyr Gln Ala Thr Asp Thr Gln Leu Asn Phe
 355 360 365

Leu Pro Gly Ala Tyr Ala Gln Ile Ser Asn Ala Ala Arg Gln Ala Trp
 370 375 380

Lys Lys Leu Pro Ser Ser Ser Thr Lys Thr Glu Asp Leu Ser Lys Val
 385 390 395 400

Arg Gln Gly Pro Asp Glu Pro Tyr Gln Asp Phe Val Ala Arg Leu Leu
 405 410 415

Asp Thr Ile Gly Lys Ile Met Ser Asp Glu Lys Ala Gly Met Val Leu
 420 425 430

Ala Lys Gln Leu Ala Phe Glu Asn Ala Asn Ser Ala Cys Gln Ala Ala
 435 440 445

Leu Arg Pro Tyr Arg Lys Lys Gly Asp Leu Ser Asp Phe Ile Arg Ile
 450 455 460

Cys Ala Asp Ile Gly Pro Ser Tyr Met Gln Gly Ile Ala Met Ala Ala
 465 470 475 480

Ala Leu Gln Gly Lys Ser Ile Lys Glu Val Leu Phe Gln Gln Gln Ala
 485 490 495

Arg Asn Lys Arg Gly Arg Gln Arg Ser Gly Asn Ser Gly Cys Phe Val
 500 505 510

Cys Gly Gln Pro Gly His Arg Ala Ala Val Cys Pro Gln Lys Gln Gln
 515 520 525

Ser Pro Val Asn Thr Pro Asn Leu Cys Pro Arg Cys Lys Lys Gly Lys
 530 535 540

His Trp Ala Arg Asp Cys Arg Ser Lys Thr Asp Val Gln Gly Thr Pro
 545 550 555 560

Leu Pro Pro Val Ser Gly Asn Trp Val Arg Gly Gln Pro Leu Ala Pro
 565 570 575

Lys Gln Cys Tyr Gly Ala Thr Leu Gln Val Pro Lys Glu Pro Leu Gln
 580 585 590

Thr Ser Val Glu Pro Gln Glu Ala Ala Arg Asp Trp Thr Ser Val Pro

Lys Asp Glu Leu Val Glu Cys Phe Lys Asn Leu Thr Ile Ala Leu Gln
 180 185 190

Asn Ala Gly Ile Lys Leu Pro Ser Asn Asn Ala Lys Ser Pro Ser Ala
 195 200 205

Pro Pro Leu Pro Pro Ala Tyr Ala Pro Ser Val Val Ala Gly Leu Asp
 210 215 220

Pro Pro Pro Gly Pro Pro Pro Pro Ser Glu Asn Met Ser Pro Leu Gln
 225 230 235 240

Lys Ala Leu Arg Gln Ala Gln Arg Leu Gly Glu Val Val Ser Asp Phe
 245 250 255

Ser Leu Ala Phe Pro Val Phe Glu Asn Asn Asn Gln Arg Tyr Tyr Glu
 260 265 270

Ser Leu Pro Phe Lys Gln Leu Lys Glu Leu Lys Ile Ala Cys Ser Gln
 275 280 285

Tyr Gly Pro Thr Ala Pro Phe Thr Ile Ala Met Ile Glu Asn Leu Gly
 290 295 300

Thr Gln Ala Leu Pro Pro Asn Asp Trp Lys Gln Thr Ala Arg Ala Cys
 305 310 315 320

Leu Ser Gly Gly Asp Tyr Leu Leu Trp Lys Ser Glu Phe Phe Glu Gln
 325 330 335

Cys Ala His Ile Ala Asp Val Asn Arg Gln Gln Gly Ile Gln Thr Ser
 340 345 350

Tyr Glu Met Leu Ile Gly Glu Gly Pro Tyr Gln Ala Thr Asp Thr Gln
 355 360 365

Leu Asn Phe Leu Pro Gly Ala Tyr Ala Gln Ile Ser Asn Ala Ala Arg
 370 375 380

Gln Ala Trp Lys Lys Leu Pro Ser Ser Ser Thr Lys Thr Glu Asp Leu
 385 390 395 400

Ser Lys Val Arg Gln Gly Pro Asp Glu Pro Tyr Gln Asp Phe Val Ala
 405 410 415

Arg Leu Leu Asp Thr Ile Gly Lys Ile Met Ser Asp Glu Lys Ala Gly

420					425					430					
Met	Val	Leu	Ala	Lys	Gln	Leu	Ala	Phe	Glu	Asn	Ala	Asn	Ser	Ala	Cys
		435					440					445			
Gln	Ala	Ala	Leu	Arg	Pro	Tyr	Arg	Lys	Lys	Gly	Asp	Leu	Ser	Asp	Phe
	450					455					460				
Ile	Arg	Ile	Cys	Ala	Asp	Ile	Gly	Pro	Ser	Tyr	Met	Gln	Gly	Ile	Ala
465						470					475				480
Met	Ala	Ala	Ala	Leu	Gln	Gly	Lys	Ser	Ile	Lys	Glu	Val	Leu	Phe	Gln
				485					490					495	
Gln	Gln	Ala	Arg	Asn	Lys	Lys	Gly	Leu	Gln	Lys	Ser	Gly	Asn	Leu	Gly
			500					505					510		
Cys	Phe	Val	Cys	Gly	Gln	Pro	Gly	His	Arg	Ala	Ala	Val	Cys	Pro	Gln
		515					520					525			
Lys	Gln	Gln	Ser	Pro	Val	Asn	Thr	Pro	Asn	Leu	Cys	Pro	Arg	Cys	Lys
	530					535					540				
Lys	Gly	Lys	His	Trp	Ala	Arg	Asp	Cys	Arg	Ser	Lys	Thr	Asp	Val	Gln
545						550					555				560
Gly	Asn	Pro	Leu	Pro	Pro	Val	Ser	Gly	Asn	Trp	Val	Arg	Gly	Gln	Pro
				565					570					575	
Leu	Ala	Pro	Lys	Gln	Cys	Tyr	Gly	Ala	Thr	Leu	Gln	Val	Pro	Lys	Gly
			580					585					590		
Pro	Leu	Gln	Thr	Ser	Val	Glu	Pro	Gln	Glu	Ala	Ala	Arg	Asp	Trp	Thr
		595					600					605			
Ser	Val	Pro	Pro	Pro	Thr	Gln	Tyr								
	610					615									

<210> 13

<211> 616

<212> PRT

<213> Artificial sequence

<220>

<223> Derived from JSRVenv

<400> 13

Met Gly Gln Thr His Ser Arg Gln Leu Phe Val His Met Leu Ser Val
 1 5 10 15
 Met Leu Lys His Trp Gly Ile Thr Val Ser Lys Pro Lys Leu Ile Asn
 20 25 30
 Phe Leu Ser Phe Ile Glu Glu Val Cys Pro Trp Phe Pro Arg Glu Gly
 35 40 45
 Thr Val Asn Leu Glu Thr Trp Lys Lys Val Gly Glu Gln Ile Arg Thr
 50 55 60
 His Tyr Thr Leu His Gly Pro Glu Lys Ile Pro Val Glu Thr Leu Ser
 65 70 75 80
 Phe Trp Thr Leu Ile Arg Asp Cys Leu Asp Phe Asp Asn Asp Glu Leu
 85 90 95
 Lys Cys Leu Gly Asn Val Leu Lys Gln Glu Glu Asp Pro Leu His Val
 100 105 110
 Pro Asp Ser Glu Pro Arg Tyr Ala Val Pro Glu Gly Val Lys Ser Asp
 115 120 125
 Pro Pro Phe Ser Asn Leu Leu Arg Pro Ser Asp Asn Asp Asp Leu Leu
 130 135 140
 Ser Ser Thr Asp Glu Ala Glu Leu Asp Glu Glu Ala Ala Lys Tyr His
 145 150 155 160
 Gln Glu Asp Trp Gly Phe Leu Ala Gln Glu Lys Gly Ala Leu Thr Ser
 165 170 175
 Lys Val Glu Leu Val Glu Cys Phe Lys Asn Leu Thr Ile Ala Leu Gln
 180 185 190
 Asn Ala Gly Ile Lys Leu Pro Ser Asn Asn Ala Lys Ser Pro Ser Ala
 195 200 205
 Pro Pro Leu Pro Pro Ala Tyr Ala Pro Ser Val Val Ala Gly Leu Asp
 210 215 220
 Pro Pro Pro Gly Pro Pro Pro Pro Ser Glu Asn Met Ser Pro Leu Gln
 225 230 235 240
 Lys Ala Leu Arg Gln Ala Gln Arg Leu Gly Glu Val Val Ser Asp Phe

Met Ala Ala Ala Leu Gln Gly Lys Ser Ile Lys Glu Val Leu Phe Gln
485 490 495

Gln Gln Ala Arg Asn Lys Lys Gly Leu Gln Lys Ser Gly Asn Ser Gly
500 505 510

Cys Phe Val Cys Gly Gln Pro Gly His Arg Ala Ala Val Cys Pro Gln
515 520 525

Lys Gln Gln Ser Pro Val Asn Thr Pro Asn Leu Cys Pro Arg Cys Lys
530 535 540

Lys Gly Lys His Trp Ala Arg Asp Cys His Ser Lys Thr Asp Val Gln
545 550 555 560

Gly Asn Pro Leu Pro Pro Val Ser Gly Asn Trp Val Arg Gly Gln Pro
565 570 575

Leu Ala Pro Lys Gln Cys Tyr Gly Ala Thr Leu Gln Val Pro Lys Gly
580 585 590

Pro Leu Gln Thr Ser Val Glu Pro Gln Glu Ala Ala Arg Asp Trp Thr
595 600 605

Ser Val Pro Pro Pro Thr Gln Tyr
610 615

```
<210> 14
<211> 615
<212> PRT
<213> Ovine pulmonary adenocarcinoma virus
```

<400> 14

Met Pro Lys Arg Arg Ala Gly Phe Arg Lys Gly Trp Tyr Ala Arg Gln
1 5 10 15

Arg Asn Ser Leu Thr His Gln Met Gln Arg Met Thr Leu Ser Glu Pro
20 25 30

Thr Ser Glu Leu Pro Thr Gln Arg Gln Ile Glu Ala Leu Met Arg Tyr
35 40 45

Ala Trp Asn Glu Ala His Val Gln Pro Pro Val Thr Pro Thr Asn Ile
50 55 60

Leu Ile Met Leu Leu Leu Leu Gln Arg Val Gln Asn Gly Ala Ala
65 70 75 80

Ala Ala Phe Trp Ala Tyr Ile Pro Asp Pro Pro Met Ile Gln Ser Leu
85 90 95

Gly Trp Asp Arg Glu Ile Val Pro Val Tyr Val Asn Asp Thr Ser Leu
100 105 110

Leu Gly Gly Lys Ser Asp Ile His Ile Ser Pro Gln Gln Ala Asn Ile
115 120 125

Ser Phe Tyr Gly Leu Thr Thr Gln Tyr Pro Met Cys Phe Ser Tyr Gln
130 135 140

Ser Gln His Pro His Cys Ile Gln Val Ser Ala Asp Ile Ser Tyr Pro
145 150 155 160

Arg Val Thr Ile Ser Gly Ile Asp Glu Lys Thr Gly Lys Lys Ser Tyr
165 170 175

Gly Asn Gly Ser Gly Pro Leu Asp Ile Pro Phe Cys Asp Lys His Leu
180 185 190

Ser Ile Gly Ile Gly Ile Asp Thr Pro Trp Thr Leu Cys Arg Ala Arg
195 200 205

Val Ala Ser Val Tyr Asn Ile Asn Asn Ala Asn Ala Thr Phe Leu Trp
210 215 220

Asp Trp Ala Pro Gly Gly Thr Pro Asp Phe Pro Glu Tyr Arg Gly Gln
225 230 235 240

His Pro Pro Ile Phe Ser Val Asn Thr Ala Pro Ile Tyr Gln Thr Glu
245 250 255

Leu Trp Lys Leu Leu Ala Ala Phe Gly His Gly Asn Ser Leu Tyr Leu
260 265 270

Gln Pro Asn Ile Ser Gly Ser Lys Tyr Gly Asp Val Gly Val Thr Gly
275 280 285

Phe Leu Tyr Pro Arg Ala Cys Val Pro Tyr Pro Phe Met Leu Ile Gln
290 295 300

Gly His Met Glu Ile Thr Leu Ser Leu Asn Ile Tyr His Leu Asn Cys
305 310 315 320

Ser Asn Cys Ile Leu Thr Asn Cys Ile Arg Gly Val Ala Lys Gly Glu

Asp Phe Leu Lys Met Arg Val Glu Met Leu His Met Lys Tyr Arg Asn
 580 585 590

Met Leu Gln His Gln His Leu Met Glu Leu Leu Lys Asn Lys Glu Arg
 595 600 605

Gly Asp Ala Gly Asp Asp Pro
 610 615

<210> 15
 <211> 615
 <212> PRT
 <213> Ovine pulmonary adenocarcinoma virus
 <400> 15

Met Pro Lys Arg Arg Ala Gly Phe Arg Lys Gly Trp Tyr Ala Arg Gln
 1 5 10 15

Arg Asn Ser Leu Thr His Gln Met Gln Arg Met Thr Leu Ser Glu Pro
 20 25 30

Thr Ser Glu Leu Pro Thr Gln Arg Gln Ile Glu Ala Leu Met Pro Tyr
 35 40 45

Ala Trp Asn Glu Ala His Val Gln Pro Pro Val Thr Pro Thr Asn Ile
 50 55 60

Leu Ile Met Leu Leu Leu Leu Gln Arg Val Gln Asn Gly Ala Ala
 65 70 75 80

Ala Ala Phe Trp Ala Tyr Ile Pro Asp Pro Pro Met Ile Gln Ser Leu
 85 90 95

Gly Trp Asp Arg Glu Ile Val Pro Val Tyr Val Asn Asp Thr Ser Leu
 100 105 110

Leu Gly Gly Lys Ser Asp Ile His Ile Ser Pro Gln Gln Ala Asn Ile
 115 120 125

Ser Phe Tyr Gly Leu Thr Thr Gln Tyr Pro Met Cys Phe Ser Tyr Gln
 130 135 140

Ser Gln His Pro His Cys Ile Gln Val Ser Ala Asp Ile Ser Tyr Pro
 145 150 155 160

Arg Val Thr Ile Ser Gly Ile Asp Glu Lys Thr Gly Lys Lys Ser Tyr
 165 170 175

Gly Asn Gly Thr Gly Pro Leu Asp Ile Pro Phe Cys Asp Lys His Leu
 180 185 190

Ser Ile Gly Ile Gly Ile Asp Thr Pro Trp Thr Leu Cys Arg Ala Arg
 195 200 205

Val Ala Ser Val Tyr Asn Ile Asn Asn Ala Asn Ala Thr Phe Leu Trp
 210 215 220

Asp Trp Ala Pro Gly Gly Thr Pro Asp Phe Pro Glu Tyr Arg Gly Gln
 225 230 235 240

His Pro Pro Ile Phe Ser Val Asn Thr Ala Pro Ile Tyr Gln Thr Glu
 245 250 255

Leu Trp Lys Leu Leu Ala Ala Phe Gly His Gly Asn Ser Leu Tyr Leu
 260 265 270

Gln Pro Asn Ile Ser Gly Thr Lys Tyr Gly Asp Val Gly Val Thr Gly
 275 280 285

Phe Leu Tyr Pro Arg Ala Cys Val Pro Tyr Pro Phe Met Leu Ile Gln
 290 295 300

Gly His Met Glu Ile Thr Leu Ser Leu Asn Ile Tyr His Leu Asn Cys
 305 310 315 320

Ser Asn Cys Ile Leu Thr Asn Cys Ile Arg Gly Val Ala Lys Gly Glu
 325 330 335

Gln Val Ile Ile Val Lys Gln Pro Ala Phe Val Met Leu Pro Val Glu
 340 345 350

Ile Ala Glu Ala Trp Tyr Asp Glu Thr Ala Leu Glu Leu Leu Gln Arg
 355 360 365

Ile Asn Thr Ala Leu Ser Arg Pro Lys Arg Gly Leu Ser Leu Ile Ile
 370 375 380

Leu Gly Ile Val Ser Leu Ile Thr Leu Ile Ala Thr Ala Val Thr Ala
 385 390 395 400

Cys Val Ser Leu Ala Gln Ser Ile Gln Ala Ala His Thr Val Asp Ser

405	410	415
Leu Ser Tyr Asn Val Thr Lys Val Met Gly Thr Gln Glu Asp Ile Asp 420 425 430		
Lys Lys Ile Glu Asp Arg Leu Ser Ala Leu Tyr Asp Val Val Arg Val 435 440 445		
Leu Gly Glu Gln Val Gln Ser Ile Asn Phe Arg Met Lys Ile Gln Cys 450 455 460		
His Ala Asn Tyr Lys Trp Ile Cys Val Thr Lys Lys Pro Tyr Asn Thr 465 470 475 480		
Ser Asp Phe Pro Trp Asp Lys Val Lys Lys His Leu Gln Gly Ile Trp 485 490 495		
Phe Asn Thr Asn Leu Ser Leu Asp Leu Leu Gln Leu His Asn Glu Ile 500 505 510		
Leu Asp Ile Glu Asn Ser Pro Lys Ala Thr Leu Asn Ile Ala Asp Thr 515 520 525		
Val Asp Asn Phe Leu Gln Asn Leu Phe Ser Asn Phe Pro Ser Leu His 530 535 540		
Ser Leu Trp Lys Thr Leu Ile Gly Leu Gly Ile Phe Val Ile Ile Ile 545 550 555 560		
Ala Ile Val Ile Phe Val Phe Pro Cys Val Val Arg Gly Leu Val Arg 565 570 575		
Asp Phe Leu Lys Met Arg Val Glu Met Leu His Met Lys Tyr Arg Thr 580 585 590		
Met Leu Gln His Arg His Leu Met Glu Leu Leu Lys Asn Lys Glu Arg 595 600 605		
Gly Ala Ala Gly Asp Asp Pro 610 615		

<210> 16
 <211> 617
 <212> PRT
 <213> Ovine enzootic nasal tumour virus

 <400> 16

Met	Pro	Lys	His	Arg	Ala	Gly	Phe	Arg	Lys	Gly	Trp	Tyr	Ala	Arg	Gln	1	5	10	15
Arg	Asn	Ser	Leu	Thr	Tyr	Gln	Met	Gln	Arg	Met	Thr	Leu	Asn	Glu	Thr	20	25	30	
Thr	Asn	Gly	Leu	Pro	Thr	Gln	Arg	Gln	Val	Glu	Ala	Leu	Met	Arg	His	35	40	45	
Ala	Trp	Asn	Glu	Ala	His	Val	Gln	Pro	Pro	Ala	Thr	Pro	Ile	Lys	Ile	50	55	60	
Leu	Ile	Met	Leu	Leu	Leu	Leu	Leu	Gln	Arg	Ile	Gln	Asn	Gly	Ala	Ala	65	70	75	80
Ala	Ala	Phe	Trp	Ala	Tyr	Ile	Pro	Asp	Pro	Pro	Met	Ile	Gln	Ser	Leu	85	90	95	
Gly	Trp	Asp	Arg	Glu	Ile	Val	Pro	Val	Tyr	Val	Asn	Asp	Thr	Ser	Leu	100	105	110	
Leu	Gly	Gly	Lys	Ser	Asp	Ile	His	Ile	Ser	Pro	Gln	Gln	Ala	Asn	Ile	115	120	125	
Ser	Phe	Tyr	Gly	Leu	Thr	Thr	Gln	Tyr	Pro	Met	Cys	Phe	Ser	Tyr	Gln	130	135	140	
Ser	Gln	His	Pro	His	Cys	Ile	Gln	Val	Ser	Ala	Asp	Ile	Ser	Tyr	Pro	145	150	155	160
Arg	Val	Thr	Ile	Ser	Gly	Ile	Asp	Glu	Lys	Thr	Gly	Lys	Arg	Ser	Tyr	165	170	175	
Arg	Asn	Gly	Thr	Gly	Pro	Leu	Asp	Ile	Pro	Phe	Cys	Asp	Lys	Asn	Leu	180	185	190	
Ser	Ile	Ser	Ile	Gly	Ile	Asp	Thr	Pro	Trp	Thr	Leu	Cys	Arg	Ala	Arg	195	200	205	
Ile	Ala	Ser	Val	Tyr	Asn	Ile	Asn	Asn	Ala	Asn	Thr	Thr	Leu	Leu	Trp	210	215	220	
Asp	Trp	Ala	Pro	Gly	Gly	Thr	Pro	Asp	Phe	Pro	Glu	Tyr	Arg	Gly	Gln	225	230	235	240

His Pro Pro Ile Leu Ser Val Asn Thr Ala Pro Ile Phe Gln Thr Glu
245 250 255

Leu Trp Lys Leu Leu Ala Ala Phe Gly His Gly Asn Ser Leu Tyr Leu
260 265 270

Gln Pro Asn Ile Ser Gly Ser Lys Tyr Gly Asp Val Gly Val Thr Gly
275 280 285

Phe Leu Tyr Pro Arg Ala Cys Val Pro Tyr Pro Phe Met Leu Ile Gln
290 295 300

Gly His Met Glu Ile Thr Leu Ser Leu Asn Ile Tyr His Leu Asn Cys
305 310 315 320

Ser Asn Cys Ile Leu Thr Asn Cys Ile Arg Gly Val Ala Lys Gly Glu
325 330 335

Gln Val Ile Ile Val Lys Gln Pro Ala Phe Val Met Leu Pro Val Glu
340 345 350

Ile Thr Glu Glu Trp Tyr Asp Glu Thr Ala Leu Glu Leu Leu Gln Arg
355 360 365

Ile Asn Thr Ala Leu Ser Arg Pro Lys Arg Gly Leu Ser Leu Ile Ile
370 375 380

Leu Gly Ile Val Ser Leu Ile Thr Leu Ile Ala Thr Ala Val Thr Ala
385 390 395 400

Ser Val Ser Leu Ala Gln Ser Ile Gln Ala Ala His Thr Val Asp Ser
405 410 415

Leu Ser Tyr Asn Val Thr Lys Val Met Gly Thr Gln Glu Asp Ile Asp
420 425 430

Lys Lys Ile Glu Asp Arg Leu Ser Ala Leu Tyr Asp Val Val Arg Val
435 440 445

Leu Gly Glu Gln Val Gln Ser Ile Asn Phe Arg Met Lys Ile Gln Cys
450 455 460

His Ala Asn Tyr Lys Trp Ile Cys Val Thr Lys Lys Pro Tyr Asn Thr
465 470 475 480

Ser Asp Tyr Pro Trp Asp Lys Val Glu Lys His Leu Gln Gly Ile Trp

Leu Ile Met Leu Leu Leu Leu Gln Arg Ile Gln Asn Gly Ala Ala
65 70 75 80

Ala	Ala	Phe	Trp	Ala	Tyr	Ile	Pro	Asp	Pro	Met	Ile	Gln	Ser	Leu		
				85					90					95		
Gly	Trp	Asp	Lys	Glu	Thr	Val	Pro	Val	Tyr	Val	Asn	Asp	Thr	Ser	Leu	
				100					105					110		
Leu	Gly	Gly	Lys	Ser	Asp	Ile	His	Ile	Ser	Pro	Gln	Gln	Ala	Asn	Ile	
				115					120					125		
Ser	Phe	Tyr	Gly	Leu	Thr	Thr	Gln	Tyr	Pro	Met	Cys	Phe	Ser	Tyr	Gln	
				130					135					140		
Ser	Gln	His	Pro	His	Cys	Ile	Gln	Val	Ser	Ala	Asp	Ile	Ser	Tyr	Pro	
145					150					155					160	
Arg	Val	Thr	Ile	Ser	Gly	Ile	Asp	Glu	Lys	Thr	Gly	Lys	Arg	Ser	Tyr	
				165					170					175		
Arg	Asp	Gly	Thr	Gly	Pro	Leu	Asp	Ile	Pro	Phe	Cys	Asp	Lys	His	Leu	
				180					185					190		
Ser	Ile	Gly	Ile	Gly	Ile	Asp	Thr	Pro	Trp	Thr	Leu	Cys	Arg	Ala	Pro	
				195					200					205		
Ile	Ala	Ser	Val	Tyr	Asn	Ile	Asn	Asn	Ala	Asn	Thr	Thr	Leu	Leu	Trp	
				210					215					220		
Asp	Trp	Ala	Pro	Gly	Gly	Thr	Pro	Asp	Phe	Pro	Glu	Tyr	Arg	Gly	Gln	
225					230					235					240	
His	Pro	Pro	Ile	Phe	Ser	Val	Asn	Thr	Ala	Pro	Ile	Tyr	Gln	Thr	Glu	
				245					250					255		
Leu	Trp	Lys	Leu	Leu	Ala	Ala	Phe	Gly	His	Gly	Asn	Ser	Leu	Tyr	Leu	
				260					265					270		
Gln	Pro	Asn	Ile	Ser	Gly	Ser	Lys	Tyr	Gly	Asp	Val	Gly	Val	Thr	Gly	
				275					280					285		
Phe	Leu	Tyr	Pro	Arg	Ala	Cys	Val	Pro	Tyr	Pro	Phe	Met	Leu	Ile	Gln	
				290					295					300		
Gly	His	Met	Glu	Ile	Thr	Leu	Ser	Leu	Asn	Ile	Tyr	His	Leu	Asn	Cys	
305					310					315					320	

Ser Asn Cys Ile Leu Thr Asn Cys Ile Arg Gly Val Ala Lys Gly Glu
 325 330 335

Gln Val Ile Ile Val Lys Gln Pro Ala Phe Val Met Leu Pro Val Glu
 340 345 350

Ile Thr Glu Glu Trp Tyr Asp Glu Thr Ala Leu Glu Leu Leu Gln Arg
 355 360 365

Ile Asn Thr Ala Leu Ser Arg Pro Lys Arg Gly Leu Ser Leu Ile Ile
 370 375 380

Leu Gly Ile Val Ser Leu Ile Thr Leu Ile Ala Thr Ala Val Thr Ala
 385 390 395 400

Ser Val Ser Leu Ala Gln Ser Ile Gln Ala Ala His Thr Val Asp Ser
 405 410 415

Leu Ser Ser Asn Val Thr Lys Val Met Gly Thr Gln Glu Asn Ile Asp
 420 425 430

Lys Lys Ile Glu Asp Arg Leu Ser Ala Leu Tyr Asp Val Val Arg Val
 435 440 445

Leu Gly Glu Gln Val Gln Ser Ile Asn Phe Arg Met Lys Ile Gln Cys
 450 455 460

His Ala Asn Tyr Lys Trp Ile Cys Val Thr Lys Lys Pro Tyr Asn Thr
 465 470 475 480

Ser Asp Phe Pro Trp Asp Lys Val Lys Lys His Leu Gln Gly Ile Trp
 485 490 495

Phe Asn Thr Thr Val Ser Leu Asp Leu Leu Gln Leu His Asn Glu Ile
 500 505 510

Leu Asp Ile Glu Asn Ser Pro Lys Ala Thr Leu Asn Ile Ala Asp Thr
 515 520 525

Val Asp Asn Phe Leu Gln Asn Leu Phe Ser Asn Phe Pro Ser Leu His
 530 535 540

Ser Leu Trp Arg Ser Ile Ile Ala Met Gly Ala Val Leu Thr Val Val
 545 550 555 560

Leu Ile Ile Ile Cys Leu Ala Pro Cys Leu Ile Arg Ser Ile Val Lys

565

570

575

Glu Phe Leu His Met Arg Val Leu Ile His Lys Asn Met Leu Gln His
 580 585 590

Gln His Leu Met Glu Leu Leu Lys Asn Lys Glu Arg Gly Ala Ala Gly
 595 600 605

Asp Asp Pro
 610

<210> 18
 <211> 611
 <212> PRT
 <213> Ovis aries

<400> 18

Met Pro Lys Arg Arg Ala Gly Phe Arg Lys Gly Trp Tyr Ala Arg His
 1 5 10 15

Lys Asn Ser Leu Thr His Gln Met Gln Arg Met Thr Leu Ser Glu Pro
 20 25 30

Thr Ser Glu Leu Pro Thr Gln Arg Gln Ile Glu Ala Leu Met Arg Tyr
 35 40 45

Ala Trp Asn Glu Ala His Val Gln Pro Pro Val Thr Pro Thr Asn Ile
 50 55 60

Leu Ile Met Leu Leu Leu Leu Gln Arg Ile Gln Asn Gly Ala Ala
 65 70 75 80

Ala Ala Phe Trp Ala Tyr Ile Pro Asp Pro Pro Met Ile Gln Ser Leu
 85 90 95

Gly Trp Asp Lys Glu Thr Val Pro Val Tyr Val Asn Asp Thr Ser Leu
 100 105 110

Leu Gly Gly Lys Ser Asp Ile His Ile Ser Pro Gln Gln Ala Asn Ile
 115 120 125

Ser Phe Tyr Gly Leu Thr Thr Gln Tyr Pro Met Cys Phe Ser Tyr Gln
 130 135 140

Ser Gln His Pro His Cys Ile Gln Val Ser Ala Asp Ile Ser Tyr Pro
 145 150 155 160

Arg Val Thr Ile Ser Gly Ile Asp Glu Lys Thr Gly Lys Arg Ser Tyr
 165 170 175

Arg Asp Gly Thr Gly Pro Leu Asp Ile Pro Phe Cys Asp Lys His Leu
 180 185 190

Ser Ile Gly Ile Gly Ile Asp Thr Pro Trp Thr Leu Cys Arg Ala Arg
 195 200 205

Ile Ala Ser Val Tyr Asn Ile Asn Asn Ala Asn Thr Thr Leu Leu Trp
 210 215 220

Asp Trp Ala Pro Gly Gly Thr Pro Asp Phe Pro Glu Tyr Arg Gly Gln
 225 230 235 240

His Pro Pro Ile Leu Ser Val Asn Thr Ala Pro Ile Tyr Gln Thr Glu
 245 250 255

Leu Trp Lys Leu Leu Ala Ala Phe Gly His Gly Asn Ser Leu Tyr Leu
 260 265 270

Gln Pro Asn Ile Ser Gly Ser Lys Tyr Gly Asp Val Gly Val Thr Gly
 275 280 285

Phe Leu Tyr Pro Arg Ala Cys Val Pro Tyr Pro Phe Met Leu Ile Gln
 290 295 300

Gly His Met Glu Ile Thr Leu Ser Leu Asn Ile Tyr His Leu Asn Cys
 305 310 315 320

Ser Asn Cys Ile Leu Thr Asn Cys Ile Arg Gly Val Ala Lys Gly Glu
 325 330 335

Gln Val Ile Ile Val Lys Gln Pro Ala Phe Val Met Leu Pro Val Glu
 340 345 350

Ile Thr Glu Glu Trp Tyr Asp Glu Thr Ala Leu Glu Leu Leu Gln Arg
 355 360 365

Ile Asn Thr Ala Leu Ser Arg Pro Lys Arg Gly Leu Ser Leu Ile Ile
 370 375 380

Leu Gly Ile Val Ser Leu Ile Thr Leu Ile Ala Thr Ala Val Thr Ala
 385 390 395 400

Ser Val Ser Leu Ala Gln Ser Ile Gln Ala Ala His Thr Val Asp Ser
 405 410 415

Leu Ser Tyr Asn Val Thr Lys Val Met Gly Thr Gln Glu Asp Ile Asp
 420 425 430

Lys Lys Ile Glu Asp Arg Leu Ser Ala Leu Tyr Asp Val Val Arg Val
 435 440 445

Leu Gly Glu Gln Val Gln Ser Ile His Phe Arg Met Lys Ile Gln Cys
 450 455 460

His Ala Asn Tyr Lys Trp Ile Cys Val Thr Lys Lys Pro Tyr Asn Thr
 465 470 475 480

Ser Asp Phe Pro Trp Asp Lys Val Lys Lys His Leu Gln Gly Ile Trp
 485 490 495

Phe Asn Thr Asn Val Ser Leu Asp Leu Leu Gln Leu His Asn Glu Ile
 500 505 510

Leu Asp Ile Glu Asn Ser Pro Lys Ala Thr Leu Asn Ile Ala Asp Thr
 515 520 525

Val Asp Asn Phe Leu Gln Asn Leu Phe Ser Asn Phe Pro Ser Leu His
 530 535 540

Ser Leu Trp Gln Ser Ile Ile Ala Met Gly Ala Val Leu Thr Val Val
 545 550 555 560

Leu Ile Ile Ile Cys Leu Ala Pro Cys Leu Ile Arg Ser Ile Val Lys
 565 570 575

Glu Phe Leu His Met Arg Val Leu Ile His Lys Asn Met Leu Gln His
 580 585 590

Arg His Leu Met Glu Leu Leu Lys Asn Lys Glu Arg Gly Ala Ala Gly
 595 600 605

Asp Asp Pro
 610

<210> 19
 <211> 135
 <212> DNA
 <213> Ovine pulmonary adenocarcinoma virus

<400> 19
 tggcgcccaa cgtgggggctc gagctcgaca gttttcttcg ccactactct cattaattga 60
 aacaagtgag tatatggata aacgggtgaa ttaatttaag gaggagtagt aaggtatata 120
 gttgagagta taaat 135

<210> 20
 <211> 136
 <212> DNA
 <213> Ovine pulmonary adenocarcinoma virus

<400> 20
 tggcgcccaa cgtgggggctc gagctcgaca gttttcttcc gccactactc tcattaattg 60
 aactaagtaa gtatatggat aaacaagtag cctaaattaa ggaggagtag taaggtatat 120
 agttgagagt ataaat 136

<210> 21
 <211> 129
 <212> DNA
 <213> Ovine enzootic nasal tumour virus

<400> 21
 tggcgcccaa cgtgggggctc gacagctttc ctcgtcacta ctcttattat ttgaactaag 60
 tgagtatttg aatgaataag tgatttacat taaagaggag tagtaaggta tatagttgag 120
 agtataaat 129

<210> 22
 <211> 135
 <212> DNA
 <213> Ovis aries

<400> 22
 tggcgcccaa cgtgggggctc gagctcgaca gttttcctcg ccactactct tattaattga 60
 aaagagtgag tatatgagta cacaagtgaa ttaaattgag gaggagtagt aaggtatata 120
 gttgagagta taaat 135

<210> 23
 <211> 132
 <212> DNA
 <213> Ovis aries

<400> 23
 tggcgcccaa catgggggcca ttcgacagct ttctctgccca ctactcttat taattgaaaa 60
 gagtgagtat atgagtatac aagtgaatta aattgaggag gagtagtaag gtatatagtt 120
 gagagtataa at 132

<210> 24

<211> 135
<212> DNA
<213> Ovis aries

<400> 24
tggcgcccaa cgtggggctc gagctcgaca gttctcctcg ccactactct tattaattga 60
aaagagtgag tatatgagta cacaagtgaa ttaaattgag gaggagtagt aaggatatata 120
gttgagagta taaat 135